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TREATMENT OF THE UMBILICUS
IN THE NEW-BORN.

WHY SHOULD WE USE THE BELLY-BAND ON THE INFANT?

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TREATMENT OF THE UMBILICUS

IN THE NEW-BORN.

The infant, after being taken in charge by the nurse, often receives but little further notice from the general practitioner, save a few inquiries at his subsequent visits, if he is in the habit of making such. Yet there are numerous points of interest about this bit of helpless humanity which should receive the careful consideration of every obstetrician, not the least among which is the treatment of the umbilicus.

Upon the establishment of respiration the function of the placenta is ended; henceforth it is a useless appendage, to be cast off forever. In the inferior animals the cord is torn from the body, at variable distances, by the struggles of the offspring, or is bitten, it is said, by the mother. Various customs exist among the different peoples of the earth regarding the management of the cord, but all have the same objects in view, viz., to be freed of the no longer needed placenta and prevent hemorrhage from the remaining stump.

It would be supposed that primitive people would naturally follow nature's method of treating the cord in childbirth, and it would be interesting to know how they came to depart from her plain teaching, and why, the more civilized they become, the further the departure. As a rule, the Indians do not sever the cord until the placenta is expelled. This also prevails in the Sandwich Islands, in Old Calabar, among the natives of Syria and the Russians of Astrakhan. The Flatheads, Koote-nais, Crows, and Creeks, however, tie and cut as soon as the child is expelled. Among the Kiowas, Comanches, and Wich-etas the cord is stripped, that the blood may be forced back toward the placenta before it is tied. The Wakamba, in

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Africa, tie the cord some two or three inches from the abdomen; the Mexicans, about three inches. The Japanese tie close to the body, and the cord is carefully preserved and laid aside with family archives until the child arrives at adult age, when he constantly carries it about, and it is finally buried with him. The Comanches leave the stump a foot long. Among the Waswahilli of Africa the stump is left very long, and it slowly dries, the navel in later years being often found the size of a fist. The Loango cut it short and dry rapidly, the process being hastened by taking the child to a fire and pressing the stump with the warmed fingers of the assistant. The Wakamba cut the cord with ordinary knives. The Loango will use nothing but the sharp edge of the stem of a palm-leaf. The Papagos of Brazil use the sharp fragment of a vessel or a shell. In New Caledonia and other oceanic islands it is cut with a shell or splint of bamboo. The Hoopas, Klamaths, and other of the Indian tribes, chew it off.*

The necessity of tying the cord does not always exist, and it is said that many of the savage and barbarous tribes do not practice it; and where the stump is left of considerable length, and where it is crushed, chewed, torn, or cut with some dull instrument, the ligature would not be necessary. From time to time attempts have been made by various modern obstetricians to do without the ligature. Some eighteen years ago Dr. Kellar† tried the experiment of not tying the cord, in the lying-in wards of the Cincinnati Hospital, by taking fifteen cases and comparing them with the like number treated in the usual manner. His observations were that those treated without tying were less troublesome and did better than those on whom the cord had been tied. The cord was cut with a pair of dull scissors, which hacked or nibbled its way through—virtually a crushing process. Prof. A. F. A. King‡ also made

*Engelmann.

†Byford, Theoretical and Practical Obstetrics.

‡Medical and Surgical Reporter, 1867.

extended experiments about the same time. In 1873 Dr. W. L. Richardson, visiting physician to the Boston lying-in hospital, tried the experiment of not tying up upon one hundred infants, and had no hemorrhage result. In these experiments the cord was not cut for half an hour, the placenta being placed in a basin beside the child.* In the Woman's Hospital of Philadelphia this plan has been followed for several years. The cord is not cut for some time, the placenta being put into a basin beside the child in its crib, and left until the physician is ready to attend to it. A few cases of hemorrhage have occurred, necessitating the use of the ligature. Dr. W. H. Bolling, Professor of Obstetrics in the Hospital Medical College, Louisville, Kentucky, writes me: "I do not ligate the cord, and I do not find it necessary to do so. I cut the cord when the child is three-fourths of an hour old, at about one and one-half inches from the abdomen."

Whether the necessity for tying exists or not, it is the almost universal custom, and in general practice should be used as a precautionary measure, for, even with it, hemorrhage will occasionally occur, but rarely of much consequence. A few drams of blood will soil a large amount of white clothing, cause consternation in the family, and generally prove more annoying to the doctor, by a hasty summons, than dangerous to the child.

There is an important point in regard to the time of tying the cord. Unless some emergency occurs, respiration should be fully established before tying. There is generally no need of haste. Keeping the child well covered to avoid chilling, we should bide our time. So long as the cord pulsates it should not be tied, especially if respiration be delayed or imperfect. Ribemont has shown that tardy ligation benefits the child by increasing the quantity of blood which is required for the establishment of the pulmonary circulation. Prof.

*These experiments were reported at the time to the Boston Obstetric Society, but I believe were never published.

Lusk, of New York, says: "In children born pale and anæmic, and suffering from syncope, late tying furnishes an invaluable means of restoring the equilibrium of the foetal circulation."*

The kind of ligature used is of more practical importance than is generally conceded. When the cord is large, and its gelatinous contents abundant and firm, more than ordinary care must be taken in tying, or the vessels will not be occluded. As the function of these vessels has ceased, there is, perhaps, an inherent tendency in them to close; hence, imperfect tying or no tying is generally sufficient. But occasionally, as the cord shrinks, the ligature becomes loose and secondary hemorrhage occurs. Different materials have been proposed and used for ligatures—tape, threads of linen, cotton, and silk, catgut, and the elastic or rubber. The latter has been the subject of much experimentation, and undoubtedly is superior to all other substances proposed.

Dr. P. Budin,† of Paris, finding that ordinary ligation of large cords, owing to the presence of Wharton's gelatine, would not occlude the vessels, but upon the shrinkage of the cord the ligature became loose, made experiments to test the relative efficiency of thread and the elastic (*caoutchouc*) ligature by passing a probe and by injecting the vessels with water. He found that after tying with a thread the probe could be passed through it the next day, but not through the elastic ligature. So, also, water could be injected past a ligation with thread, even though tied with great force; but with the elastic ligature it was possible to tie so as to wholly occlude the vessels, and, owing to its elasticity, it will follow the recession of tissue due to shrinkage of the cord.

The most recent, and, perhaps, satisfactory, experiments with

* Medical News and Abstract, November, 1881. London Medical Record, August 15th, 1881.

† Obstetrical Journal of Great Britain, February, 1880. American Journal of Medical Science, April, 1880, page 567.

ligatures are those lately made by Crede and Weber,* at the Leipsig Obstetric Clinic. In repeating Budin's experiments, they found that a single linen ligature upon a large cord was not sufficient to prevent the passage of water through its vessels under moderate pressure. Strong pressure was followed by like results when the ligature was wound two, three, and four times around the funis and tied as tightly as possible. With shrinkage of the cord, the ligatures were loosened. They decided that, of all the materials used for ligatures, caoutchouc, on account of its elasticity, thereby following up the shrinkage of the cord, is the best. This material, or a slender, rubber drainage-tube, has been used in their clinic since July, 1883, with perfect success, and they have demonstrated that, if well applied, secondary hemorrhage is impossible. It can, therefore, be applied quite near the umbilicus — "an advantage not to be undervalued, for the shorter the residual cord, the less danger of traumatic inflammation of the navel."

Crede and Weber, in the article above alluded to, give Budin the credit of first using the elastic ligature on the funis. I am not able to give the exact date of his first use of it, but place it in 1879, as the article referred to, in the *Obstetrical Journal of Great Britain*, February, 1880, speaks of Budin's communication and experiments as recent. The same article also says "'The Caoutchouc Ligature' was the subject of a communication by Dr. Dickson to the Obstetrical Society of Edinburgh in 1874, but was not received with much favor." If these dates are correct, as I believe them to be, priority of use for this purpose must be accredited to America, for Dr. James Craig, of Jersey City, New Jersey, used it over twenty years ago, and it was the subject of a paper by him published in the transactions of the Medical Society of New Jersey in

* Abstract of Crede and Weber's paper, by Dr. C. M. Green, Boston Medical and Surgical Journal, January 29th, 1885, from Archiv für Gynäkologie, Band XXIII, Heft 1; also, American Journal of Medical Science, April, 1885, page 597.

1870.* He used the rubber band known as Faber's No. 20. In a letter to me, under the date of February 14th, 1885, Dr. Craig says: "I cannot give the exact date, but began the use of the elastic ligature in the latter part of 1861 or early part of 1862. Its use for that purpose was original with me."

The necessity — or, at least, the advisability — of the ligature being conceded, at what distance from the abdomen should it be applied? Among authors and practitioners, as will be seen by the accompanying tables, a wide difference of opinion and practice prevails, varying from "close to the abdomen" to "three or more inches." As the stump of the cord soon becomes dead up to the line of junction with the abdomen, often becomes fetid and offensive, and is liable to be pulled in handling and dressing the child, it would seem reasonable that the shorter the stump, the better.

Two reasons are given why the stump should be left long — first, to avoid tying a loop of intestine which might be protruding into a perforate funis; second, to leave room for re-tying in case of hemorrhage. The first condition rarely exists, but may readily be avoided by careful examination, or by temporarily tying a few inches from the abdomen and subsequently re-tying after the child is washed and the physician has more leisure. The second reason is insufficient, for a second ligature could be as readily applied close beside or within one-eighth or one-fourth of an inch from the first as at a greater distance; and if the stump be maintained impervious until exuviation occurs, it matters not whether the thrombus in the stump be one-half of an inch in length or three. I have tied at variable distances, but of late years tie at about one-fourth of an inch from the abdomen, and the stump, when fresh, is scarcely half an inch long, and by shrinkage becomes even shorter. In a case of secondary hemorrhage from a short stump, on the third day, in consequence of shrinkage of the cord — a cotton ligature being used — I re-tied close to the integument very easily and with good result.

* Medical and Surgical Reporter, November 29th, 1884.

The advantages of a short stump are: less dead tissue; less fetor and offense if the child be carelessly cared for after passing from under the physician's observation; the short stump shrinks down and sinks into the umbilical depression, becoming a mere scab or crust, and, not being prominent, like a long stump, is less liable to get pulled or torn from rough handling — or, as Crede and Weber state it, "The shorter the residual cord, the less danger of traumatic inflammation of the navel."*

The cord being tied and cut, how should it be dressed? Here, too, will be found much variety in the methods in use, from the old woman's way of folding in a scorched, greased rag and tightly binding down under the belly-band, to no dressing whatever. A natural and desired result to be obtained should be a safe guide in treating the stump. This is no less than the separation of the cord and complete cicatrization of the umbilicus. The residual cord dies, and is generally said to putrefy and ulcerate off at the navel. I admit that the statement is mainly correct as the stump is ordinarily treated — with greased rag and belly-band — but that it is a natural, proper, or desirable process, I most emphatically deny; the stump should neither putrefy nor slough. M. Billard says: "The cord does not putrefy, but dries and shrivels up. This drying only occurs in the living child; if the child dies before the cord separates, the drying is immediately suspended. The cord of a dead child never dries, but putrefies."† Vogel says: "Desiccation occurs only in the living child. If the child dies soon after birth, the cord does not dry, but rots."‡ J. Lewis Smith says: "When properly managed, the cord desiccates and drops off between the third and ninth days. The nurse should not be allowed to oil it, as she will sometimes do unless forbidden, as this retards desiccation. * * * If the dressing of the cord be allowed to remain wet from urine or otherwise, the cord does not desiccate, but decomposes."§ Leishman says: "The stump undergoes a process of putrefaction

* *Ante cit.*

† *Maladies des enfans*, quoted by Dewees.

‡ *Diseases of Children.*

§ *Ibid.*

which is a form of withering, rather than of moist putrefaction.”* Churchill says “The stump dries up and withers.”† Playfair speaks of the cord as “withered.”‡ Meigs says: “It becomes perfectly dry, and of a crisp, corneous hardness.”§

Does not this process indicate more of a vital action, in the drying and separation of the cord only on the living child, than is generally suspected? That this is the natural process is proven by observations on the inferior animals, or on the human infant, by treating the stump dry, or, better yet, by free exposure to the air without any dressing whatever; and it is in direct and desirable opposition to the “putrefying mass” and “putrescent discharges” often mentioned and met with. That this process of desiccation should be promoted, and that our treatment should be directed to secure this result, is evident; therefore, all greasy or moist applications should be absolutely discarded. Many authors and practitioners, as shown in the tables, dress with dry linen or absorbent cotton, simply to protect the stump and prevent contact with the skin. This is a vast improvement over the greased rag, but any pad or compress over the stump confines to it the heat of the body, and thus tends to keep it moist and prevent rapid drying. Free exposure to the air is far better adapted to secure the desired result, and the application of some antiseptic absorbent powder will prevent all excoriation or chafing of the skin.

The separation of the stump occurs after the third day, and I am satisfied that the process occurs more rapidly with the dry or exposed treatment than when the stump is kept moist with grease, vaseline, or by being confined near the warm body by compress and band. If the stump is kept moist and decomposes, it sloughs or ulcerates off, but with the natural or dry treatment it is cast off by a process of absorption,|| or, as Goodell aptly puts it, “Falling off, like a ripe fruit, without leaving a raw stump.”¶

* System of Midwifery.

† *Ibid.*

‡ *Ibid.*

§ Meigs, Diseases of Children.

|| *Ibid.*

¶ Note in Parry's edition Leishman's System of Midwifery.

After the separation of the stump the umbilicus may remain an open ulcer, which is slow to heal, and may become a source of purulent infection and danger to the child. This may be the result of improper treatment of the stump. Condie says: "It is very generally the result of neglect or mismanagement on the part of the nurse; in a few instances, the result of slow and imperfect separation of the cord, rude management in washing and dressing, rude dragging or other injudicious attempts at separation, or by the ridiculous practice of dressing the navel subsequently with a burnt rag, grease, and even more improper applications."* J. Lewis Smith, after objecting to the moist treatment of the cord, as before noted, adds, "The decaying cord is apt to produce inflammation of the navel."

Ulceration of the navel has often been found to lead to fatal pyæmia by infection through the umbilical vessels, as noticed a few years ago by Mr. Jonathan Hutchinson and Drs. Roper, Hasse, and Arthur Edis, of London.† Dr. Max Runge, of Berlin, reports forty-five cases of navel ill, in twenty-four of which a careful autopsy was made. In every case he found inflammation of the umbilical arteries, from which he concludes that "Inflammation of the umbilical arteries is not in all cases a disease tending to recovery; it may, *per se*, cause death, and it may lead to pyæmia. In the cases in which pyæmia occurred, there was no channel except the umbilicus through which the infective poison could have entered the circulation."‡ The diagnosis was exceedingly obscure. In many of Dr. Runge's cases its existence was not suspected during life. The death-rate was about forty-five per cent. If the disease is of septic origin from infection through the umbilicus, the obvious source of such infection is the bit of dead cord between the abdominal wall and the ligature. To prevent such infection, an aseptic condition of this structure must be maintained. With this view, Dr. Runge carefully ex-

* Diseases of Children.

† American Journal of Medical Science, April, 1882, page 606.

‡ Zeitschrift für Geburtshülfe und Gynäkologie, Band VI., Heft 1.

perimented with different methods of treating the stump of the cord after its ligature, as follows: 1, simply exposed to the air; 2, enclosed in a glass case, so that evaporation of moisture was prevented; 3, wrapped in a rag soaked in carbolized oil; 4, wrapped in a dry rag. Nos. 1 and 4, which were simply kept dry, quickly mummified without smell; No. 2, in which evaporation was prevented, soon became fetid; No. 3 did not get fetid, but did not shrivel up. He concludes that the best way of treating the stump is to keep it as dry as possible, the only application used being a powder of salicylic acid and starch. More recently, Monti* supports Runge from observation of cases. Is it not possible that occasional deaths in early infancy, which occur in nearly every one's practice, may be sometimes due to this unsuspected cause?

Another danger from an unhealed navel after the separation of the cord is the liability to hemorrhage—an accident of great gravity, generally proving fatal in spite of even heroic remedies. Usually the umbilical vessels become impervious from the second to the fifth day, and before the separation of the cord. This obliteration extends to the liver in the vein and to the fundus of the bladder in the arteries; but, from some constitutional vice, a hemorrhagic diathesis, or traumatic injury by rude separation of the cord, hemorrhage may occur from the unclosed vessels or from capillary oozing. It may occur before birth from laceration or injury to the cord (Bouchut).† Minot, Stephen Smith, J. Foster Jenkins, Bowditch, Bailey, and Otis have written exhaustively on this subject. The prognosis is very unfavorable: five-sixths of the cases prove fatal.‡ Styptics, compression, constant pressure with the fingers, and filling the navel with plaster of Paris, may be tried. These failing, deep ligation with needles may be resorted to, as has been done with success.

These dangers admonish us to secure as early and complete cicatrization as possible, and though their occurrence is rare,

* Archiv für Kinder. American Journal of Obstetrics, July, 1882.

† J. Lewis Smith, Diseases of Children.

‡ *Ibid.*

yet who can tell how soon a case may occur to one of us? Ulcers of the umbilicus should be treated with iodoform, bismuth subnitrate, or calomel, and it may be necessary to use nitrate of silver also. It should be kept perfectly dry, clean, and free from grease of all kinds.

It has long been the custom to envelop the infant's body in a belly-band. The origin of this custom I have been unable to ascertain, but it is quite general among civilized peoples. The main reasons given for its use, as will be seen, are: 1. warmth; 2. to retain the dressing of the cord; 3, to support the abdominal walls and prevent umbilical hernia. But I believe that a large majority of the profession use it, or allow its use, as the old women do, because they have been taught to do so, and have never given the subject sufficient thought to see its uselessness, or have not the courage or inclination to oppose an old custom.

If warmth be the object of its use, then it can be readily discarded and better replaced by extra clothing. If no dressing be applied to the stump, as practiced by many of our best obstetricians, it will not be needed. At any rate, it is not needed for that purpose after the separation of the cord and healing of the navel. Is it necessary to give support to the abdominal walls? Has nature, usually so careful of her work, made such a blunder in this particular as to require our constant interference to remedy the defect? The abdominal walls are composed of tough, aponeurotic membranes, between which are several muscular layers whose fibers traverse the abdomen in different directions, in a manner that insures the greatest possible strength. In no other part of the body is there so complete an arrangement of soft tissues, insuring stability and permanence. At the umbilical and inguinal rings only is there any defect or weakness, and at these points only do the walls give way, except in case of traumatic injury. The abdominal walls need no support, save such as nature provides, in the development of muscular and fibrous substance. Can this be promoted by bandaging or by being kept at rest? The very

foundation principles upon which strong muscular and fibrous development and growth depend are free exercise and free play, which, in the infant, are produced by the acts of respiration and crying. How can this be had if confined by the band?

Does its use prevent umbilical hernia? The umbilical ring is the last abdominal opening to close in foetal development; but an arrest or delay in development may leave this part of the abdomen deficient, and protrusion of some part of the abdominal contents will result, aided by violent coughing, straining, or crying. The umbilical ring is surrounded by fibers from the sheaths of the recti muscles, which cross, decussate, and interlace, forming parabolic curves, the arrangement of which gives a circular investment, which, in contracting, tends powerfully to close the opening,* and the contraction and exercise of all the abdominal muscles aid in producing this effect; hence, the greater the development of these muscles, the better will this result be accomplished, or, as Wood states it, "Up to the period of puberty, exercise of the abdominal muscles will aid in the cure of congenital umbilical hernia."†

Condie says "Umbilical hernia (in the infant) is strictly a congenital hernia."‡ Dewees states that "It is, in general, owing to a natural defect of the part."§ And this is the almost universal opinion of the leading surgeons of to-day. Therefore, it being mainly caused by a deficiency at the umbilical ring, and as there is a natural tendency for this to be closed by development of tendinous fibers upon muscular exercise of the abdomen, any application of a general abdominal band sufficient to have any retaining effect upon a presumptive or real hernia must so confine the abdomen as to defeat the very object that should be always kept in view, viz., its radical cure. Nay, further, the band, by confining the abdomen, pre-

* Wood, International Surgery, Vol. V., article "Hernia."

† *Ibid.*

‡ Diseases of Children.

§ Dewees on Children.

vents an elastic expansion of its walls, compresses its contents and forces them into the weaker openings, and tends to produce the very thing we wish to avoid. On this we have the testimony of Dewees, who says: "Umbilical hernia is often caused by a too tight application of the belly-band when, from the conformation of the parts, there is a disposition to it."* Hodge says: "Among the causes of umbilical hernia ought to be mentioned, perhaps, the binder usually applied to the body of the infant. Nurses, under various pretenses, often apply it so tightly as to compress the intestines, and, of course, force them violently against the natural openings of the umbilicus and groin." I am aware that the most of our teachers of obstetrics advocate or allow its use. Even Dewees taught that it should be worn until the child was four months old. But many prominent obstetricians and practitioners of the present time have wholly discarded it, as will be seen. Among the number, Goodell, A. F. A. King, and Byford have been pioneers in the movement, and have done much toward educating the profession that its use is not only unnecessary, but mainly injurious. It goes for naught that its advocates say that it should not be tightly applied; the nurse will, and invariably does, pin it firmly, generally tightly, in the physician's absence. It not only retards the development of the abdominal muscles, but it interferes with respiration, prevents proper peristaltic action of the bowels, makes the child uncomfortable after nursing, and subjects it to being dosed for colic; and any supposed advantage gained by support of the umbilicus is more than counterbalanced by the tendency to force the viscera into the unsupported and weaker inguinal openings.

In the following tables, No. 1 exhibits the opinions of such authors as I have been able to consult on the proper distance from the abdomen to tie the cord, method of dressing the stump, and use of the belly-band; No. 2 shows the present American teaching and practice in regard to the same.

* Diseases of Children.

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TABLE NO. 1—SHOWING THE TEACHINGS OF VARIOUS AUTHORS IN RELATION TO THE DISTANCE FROM THE ABDOMEN IN TYING THE CORD, THE METHOD OF TREATING THE STUMP, AND THE USE OF THE BELLY-BAND.

AUTHOR.	LIGATURE FROM ABDOMEN.	DRESSING OF STUMP.	USE OF BELLY-BAND.
LEISHMAN, System of Midwifery.	2 to 3 inches.	Wrap in square of cotton or linen. After separation, apply soft pad of linen.	To retain dressing.
VERRIER, Manual of Obstetrics.	6 centimeters, 2 to 2.5 inches.	Wrap in greased compress, changed from time to time.	To retain dressing. Wear for six weeks.
PLAYFAIR, System of Midwifery.	1½ inches. Strips cord.	Wrap in charred linen, renewed daily. After separation, a pad of soft linen placed over the umbilicus.	To retain dressing, and prevent tendency to umbilical hernia.
TYLER SMITH, Prim. and Prac. of Obstet.	2½ to 3 inches.	Wrap in singed linen.	
CAZEAUX, Theoret. and Pract. Mid.	"Strips cord. As a general rule, it is best to leave sufficient space for second ligature, if needed."	Linen compress over and around the cord.	Uses band twice around the body.
HOBBS, Prim. and Prac. of Obstet.		"The dressing of the umbilicus demands no other attention than keeping the parts clean, so as to keep the skin from being irritated by the putrescent discharges from the cord."	"Among the causes of umbilical hernia ought, perhaps, to be mentioned the binder usually applied to the body of the infant. Nurses, under various pretenses, often apply it so tightly as to compress the intestines, and, of course, force them violently against the natural openings of the umbilicus and groin."
BEEFORD, Prim. and Prac. of Obstet.	2 inches.	With linen compress and band. Burnt linen after separation.	

MEIGS, Treatise on Obstetrics, Diseases of Children.	1½ inches.	Envelop in square of linen, to receive discharge from cord and prevent it from being glued to the infant's clothes. "There is no other use in the dressing of which I am aware."	To retain dressing, favor recession of the umbilicus, and prevent umbilical hernia.
MEADOWS, Manual of Midwifery.	2½ inches.		
WARRINGTON, Obstetrical Catechism.	2 inches.	Envelop in square of linen, to prevent contact with abdomen as a putrefying mass, and cause irritation.	Merely to support the cord and retain dressings.
RYAN, Manual of Midwifery.	2 inches.	Envelop in soft rag, secured by band.	
SCHROEDER, Manual of Midwifery.	3 centimeters.	Envelop in piece of old linen, secured by band. Renew in a few days. After separation, all dressings may be omitted.	It is best to leave the child, after separation of the stump, without the binder.
M. CHAILLY, Midwifery.	Strips cord; 2 or 3 fingers' breadth.	Envelop in linen compress, secured by band.	
TANNER, Hand-book of Pract. Obst.	2½ inches.		
MILLER, Human Parturition.	2 fingers' breadth		
VOGEL, Diseases of Children.		Wrap in soft piece of cotton or linen rag, secured by band.	To retain dressing.
DEWEES, System of Midwifery, Diseases of Children.	1½ inches.	Dress with linen rag and belly-band. "The only necessity for applying anything to this part is to prevent the dead navel-string from coming in contact with the skin of the child."	Band should be worn until child is four months old, to give a general support to the abdomen and a particular one to the navel, to prevent umbilical hernia; and adds: "Great care must be taken, or it will cause the very result we wish to avoid."

TABLE NO. 1 — (CONTINUED).

AUTHOR.	LIGATURE FROM ABDOMEN.	DRESSING OF STUMP.	USE OF BELLY-BAND.
BYFORD, Theory and Practice of Obstetrics.	1 inch.	"Covered longitudinally with soft linen, and then rolled in soft tape."	"Nurses and mothers should be taught that there is no danger of the child fall- ing to pieces or sustaining rupture if not encased in a swathe from head to foot. The belly-band should be uncer- emoniously discarded, as impeding respi- ration and circulation."
CREDE AND WEBER, Archiv für Gynäkologie, Band XXIII., Heft 1.	Close to abdo- men. Uses the elastic ligature.	Envelop in dry absorbent cotton, renewed daily.	To retain dressing.
CHURCHILL, System of Midwifery.	2 inches.	Stump dries up and withers.	Belly-band should be discarded, as im- peding respiration and circulation.
COBB, Obstetrical Questions and Answers.	1 inch.	Cover stump longitudinally with soft linen, and rolled in soft tape from um- bilicus outwards. So dressed merely to keep desiccating cord from contact with the skin.	"If there be no defective development of the abdominal walls, the infant needs no artificial support."
A. F. A. KING, Manual of Obstetrics.	1½ inches. Strips cord.	"This old-fashioned custom [enveloped in square of greased rag, secured by the belly-band] is not, by any means, a good one. It is inconvenient, as well as un- comfortable and injurious to the child. The cord is better left without any dress- ing at all, except a little raw cotton (bo- rated or slightly carbolized), to absorb its moisture and prevent its sticking to the clothing."	
CLAY, Complete Hand-book of Obstetrical Surgery.	2½ inches.		
ROBERTS, Guide to the Practice of Midwifery.	2 inches.		

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TABLE NO. 2 - SHOWING PRESENT AMERICAN TEACHING AND PRACTICE IN RELATION TO DISTANCE FROM THE ABDOMEN IN TYING THE CORD, THE METHOD OF DRESSING THE STUMP, AND THE USE OF THE BELLY-BAND (as ascertained by private correspondence with professors and teachers of Obstetrics and prominent practitioners throughout the country).

AUTHORITY.	LIGATURE FROM ABDOMEN.	DRESSING OF STUMP.	USE OF BELLY-BAND.
W. M. POLK, M.D. University Medical College, New York.	3 inches.	"Envelop in a square of linen, after dusting with powdered starch. The object is to favor rapid drying of the stump."	To retain dressing in place.
E. W. JENKS, M.D. Detroit, Mich.	2 inches.	Envelop in double fold of linen, retained by band.	"I pay no attention to it, except when required for stump, or when there are indications of umbilical hernia."
R. S. SUTTON, M.D. Pittsburgh, Pa.	4 inches.	Envelop in dry muslin. "It remains perfectly dry."	"1st. To secure compress. 2d. To prevent colic. 3d. For warmth. 4th. Cautom."
BESZ. F. DAWSON, M.D. Post-graduate School of Medicine, New York.	1 inch.	"I have not of late, even in my own family, applied any dressing to the stump, leaving it free to dry up, which occurs very rapidly."	Does not use it. "For the reason that it is unnatural, annoys the infant, and prevents proper peristaltic action of the bowels."
H. C. PEABODY, M.D. Columbus Med. College, Columbus, Ohio.	2 inches.	Envelop in absorbent cotton.	To support the abdominal walls and prevent umbilical hernia.
CHAS. JEWETT, M.D. Long Island Hosp. Med. Coll., Brooklyn, N. Y.	1½ inches. Strips cord.	Envelop in soft, dry muslin or absorbent cotton, to promote rapid dessication. No grease.	"To prevent umbilical protrusion."
M. MICHEL, M.D. Med. Coll. of South Carolina, Charleston.	½ to 1 inch.	"Dry, borated cotton."	"Only to adjust navel dressing."

TABLE NO. 2 — (CONTINUED.)

AUTHORITY.	LIGATURE FROM ABDOMEN.	DRESSING OF STUMP.	USE OF BELLY-BAND.
MARY P. JACOBI, M.D. Woman's Medical College, Post graduate School of Medicine, New York.	1 inch.	Cover with square of fine linen smeared with vaseline.	"Partly for warmth and partly to protect umbilical ring, during retraction and cicatrization, against pressure of intestines."
G. A. MOSES, M.D. St. Louis Medical College.	1½ to 2 inches. Strips, if large.	"Let it strictly alone, no dressing whatever being required."	"No, unless some reason appears. It is ordinarily useless, and perhaps hurtful, by producing pressure."
E. L. PARTIDGE, M.D. Post-graduate School of Med. Coll. of Phys. and Surg., New York.	1 in.-l. Strips cord.	"Place stump in a piece of folded soft linen and leave to nature."	"For warmth and to protect stump and dressing."
B. B. BROWNE, M.D. Polyclinic Woman's Med. Coll., Baltimore.	1½ inches.	Envelop in old linen dipped in clean lard.	"To retain dressing and prevent umbilical hernia."
M. D. MANS, M.D. Med. Dept. Buffalo University, Buffalo, N. Y.	1½ to 2 inches.	Wrap in absorbent cotton and let alone. No vaseline or grease.	For warmth and to retain dressing.
WM. T. LISK, M.D. Bellevue Hospital Med. Coll., New York.	2 inches.	"Wrap in borated cotton, and direct to left side."	"To retain dressing."
CHRIST. TOMKINS, M.D. Med. Coll. of Virginia, Richmond.	2½ inches.		For comfort, warmth, and to prevent umbilical hernia.
W. H. WATHEN, M.D. Kentucky School of Med., Louisville.	1 inch.	Envelop in old linen or fine cotton.	"To hold cord in position, furnish support to abdomen of child, and give abdomen better shape."
J. H. CARSTENS, M.D. Detroit Medical College, Detroit, Mich.	1½ inches.	Envelop in oiled cloth.	"To prevent a tearing of cord near abdomen a day or two after birth. This might cause hemorrhage. Have seen such cases."

W. H. BORLING, M.D. Hospital Coll. of Med., Louisville, Ky.	"Do not ligate cord; not necessary."	"I cut the cord when the infant is three-fourths of an hour old, at one and one-half inches from the abdomen. By this method no dressing or application is necessary."	"A lightly-applied flannel bandage until cord drops off, absorbs drainage, keeps the belly warm, and gratifies mother and nurse."
W. M. C. DABNEY, M.D. Pres. Med. Exam. Board of Virginia, Charlottesville.	1 inch.	Envelop in square of linen smeared with vaseline.	"To prevent umbilical hernia."
W. W. JAGGARD, M.D. Chicago Medical College, Chicago, Ill.	1½ to 2 inches.	"Powder stump with iodoform and envelop in disinfected surgeons' lint. Renew daily."	"To retain stump in place."
H. F. CAMPBELL, M.D. President of the American Medical Association, Augusta, Ga.	2 inches.	Fold in square of linen smeared with vaseline or lard.	"1st. On account of precedent or habit. 2d. Because my experience confirms its value. 3d. Because it accords with good surgical principles, that we should not leave vessels which so recently transmitted so large a current of blood without the security and support of the belly-band, until their caliber has been, by clot or otherwise, obliterated, and until adhesive inflammation has sealed the point of separation between the dead and living vessels. Without this support this union might be broken prematurely."
P. S. LEISENRING, M.D. Omaha Medical College, Omaha, Neb.	1½ to 2 inches.	Wrap in soft linen or muslin oiled with vaseline.	"1st. Because it keeps the dressing of the stump in place. 2d. I often think it prevents umbilical hernia. I always apply it loosely."
B. BUCKLE, M.D. Med. Dept. University of Louisville, Kentucky.	1½ to 2 inches.	Wrap in clean linen.	To protect stump and prevent umbilical hernia.
J. A. SCHOOGS, M.D. Coll. of Phys. and Surg., Keokuk, Iowa.	1½ inches.	Wrap in absorbent cotton.	To retain dressing.

TABLE NO. 2 (CONTINUED).

AUTHORITY.	LIGATURE FROM ABDOMEN.	DRESSING OF STUMP.	USE OF BELLY-BAND.
ROBERT BARRY, M.D. Rome, Ga.	2 fingers' breadth.	Envelop in a soft cloth.	To retain dressing.
THAD. A. REAMY, M.D. Medical College of Ohio, Cincinnati.	2 inches. Strips cord.	Dress with a square of muslin. Stump allowed to shrivel and drop off of its own accord.	"Use belly-band, but not tightly, for purpose of dressing stump and preventing friction. It also aids, if properly applied and a proper pad laid under it, to prevent protrusion."
GEO. E. MEXEEN, M.D. Coll. of Phys. and Surg., Boston, Mass.	2 inches. Winds with rubber band. "Don't consider ligation necessary."	"Pass stump through hole in square of muslin and surround with borated cotton."	"For protection of cord and warmth only. Am careful to have it loose, so as not to impede respiration."
T. GAILLARD THOMAS, M.D. Coll. of Phys. and Surg., New York.	2 inches.	Wrap in carbolized vaseline and lay on abdomen under compress.	"To hold compress in place and prevent hernia in early period of infancy, from crying, etc."
WM. GOODELL, M.D. University of Pennsylvania, Philadelphia.	3 fingers' breadth.	"After being stripped of blood and tied, the cord has nothing more done to it, but dangles undressed. Thus treated, it dries up without bad smell, and drops off without leaving a sore. I have pursued this plan with 2,100 infants, and always with great satisfaction."	"No, because it is of no use whatever in preventing umbilical hernia, and it tends to inguinal hernia. Among the 2,100 infants dressed without the belly-band, I cannot recall one that subsequently needed a truss for umbilical hernia."
JOHN MOFFET, M.D. Central Coll. of Phys. and Surg., Indianapolis, Ind.	2 to 3 inches.	Envelop in square of soft muslin, with hole burned in center and greased with sweet lard.	"To support that part of the abdominal wall fast to close in fetal development, the umbilical region."
A. ADX, M.D. Muscatine, Iowa.	$\frac{1}{4}$ inch, and cut close.	"Let it alone; no dressing of any kind. It will desiccate and become a mere scab in twenty-four hours, generally separating in four days without suppuration. I have treated over five hundred cases without trouble of any kind."	Does not use it. "It is a useless relic, conducing to hernia, both inguinal and umbilical. Interferes with respiration and the early healing of the umbilicus. Have not had much trouble in overcoming the prejudice of the people."

B. McE. EMERY, M.D. Post-graduate Medical School, New York.	1 inch.	"Wrap in soft cloth dusted with iodo- form and smeared with cold cream."	"To hold dressing of stump and favor recession of umbilicus after separation."
F. E. BECKWITH, M.D. Med. Dept. of Yale, New Haven, Conn.	1 inch.	Dress with vaseline and soft linen.	"For warmth only, with a very little sup- port."
Jos. T. JOHNSON, M.D. Med. Dept. of University of Georgetown, D. C.	2 to 3 inches.	Compress of absorbent cotton.	Custom. "I think often too tight."
CHAS. M. GREEN, M.D. Med. Dept. of Harvard, Boston.	1½ inches.	"I twist about the stump a strip of linen and place it in a pad of linen."	"To protect the stump as an abdominal support, and to prevent umbilical her- nia."
W. H. BYFORD, M.D. Rush Med. Coll., Chicago.	1½ inches.	"Simply wrap in dry cotton until it drops off."	Does not use it, "Because I think it un- necessary."
B. F. BAER, M.D. Maternity Hospital, Phil- adelphia.	1½ inches. Strips cord.	Cover with borated or salicylated cotton.	"To support the stump dressing only."
F. M. JOHNSON, M.D. Kansas City Med. Coll., Kansas City, Mo.	2 inches. Strips cord.	Envelop in dry linen or cotton cloth. No grease or oil.	To hold dressing and prevent umbilical hernia.
C. F. DUTTON, M.D. Med. Dept. Wooster Uni- versity, Cleveland, Ohio.	2 inches.	Envelop in linen. Oil abdomen to pre- vent sticking.	"Sometimes, because nurses and mothers demand it. Sometimes not, because it is useless, and, if tightly applied, injur- ious. When I can have my own way I omit it entirely, and dress with absorb- ent powder or carbolized cotton. Cut stump shorter for latter dressing."
A. REEVES JACKSON, M.D. Coll. of Phys. and Surg., Chicago.	1½ inches.	Wind stump with roller bandage one-half inch wide.	"I permit the use of a belly-band if loosely applied. I prefer not using it, because it is unnecessary."
G. O. MORGENTHAU, M.D. Muscatine, Iowa.	As close as pos- sible and not include the in- tegument.	Cover with a piece of old linen.	"I do not use it. I think it encumbers the child, and often renders it uncon- fortable. It can do no good, and, if tightly adjusted does harm."

TABLE NO. 2 — CONTINUED.

AUTHORITY.	LIGATURE FROM ABDOMEN.	TREATMENT OF STUMP.	USE OF BELLY-BAND.
W. H. TAYLOR, M.D. Miami Med. Coll., Cincinnati, Ohio.	2 inches.	Envelop in cotton and cover with a compress.	"To protect cord from injury in dressing child."
ELY VAN DE WARKER, M.D. Syracuse, N. Y.	2 inches.	Wrap in absorbent cotton.	"To give gentle support to abdomen of child."
W. H. SHARP, M.D. Volcano, W. Va.	1 1/4 to 1 1/2 inches. Strips, if large.	Wrap in greasy linen or cotton cloth. "Sometimes wind cord as one would wind a cut finger."	From habit and deference to custom. I think it neither of benefit nor injury to child.
JAS. K. CHADWICK, M.D. Med. Dept. of Harvard, Boston.	2 to 3 inches.	"Wrap in dry linen, so that it may dry up and not slough, as when kept moist."	"Because I was taught to do so, and have fancied that the band, to a moderate extent, supported the abdominal walls and tended to prevent umbilical hernia."
J. F. KENNEDY, M.D. Iowa Coll. of Phys. and Surg., Des Moines, Iowa.	1 1/2 to 2 inches.	Wrap in square of soft linen or muslin.	"Was so taught by Meigs and Bedford. Have practiced it for many years, have seen no bad effects, and know of no good reason for omitting it."
C. HENRI LEONARD, M.D. Michigan Medical Coll., Detroit.	2 inches.	Pass through hole in square of old linen. Surround with cotton and cover with another piece of linen.	To retain dressing, protect stump from injury, and prevent umbilical hernia.
ELLERSLIE WALLACE, M.D. Jefferson Medical Coll., Philadelphia.	1 inch. Strips cord.	"I do not wrap the cord in a rag. I grease the abdomen around the cord, lay the cord down, and apply the bandage."	"To prevent protrusion at the umbilicus, lest hernia occur."
JOHN M. KEATING, M.D. Philadelphia Hospital.	2 inches. Strips cord and ties for precaution.	Envelop in square of soft linen. "No vaseline or ointment whatever."	"I use a thin flannel belly-band, using no compression, simply to give warmth and prevent undue straining, in order to avoid umbilical hernia."
J. McF. GASTON, M.D. Atlanta, Ga.	2 inches.	Folded in square of old cotton or linen.	To retain dressing and prevent any tendency to umbilical hernia.

T. A. ASHBY, M.D. Polyclinic, Post-graduate Med. School, Baltimore.	2½ to 3 inches.	"Pass stump through hole in square of muslin. Surround it with two rolls of muslin along either side. Cover with muslin and band."	To protect cord from friction and displacement.
G. J. ENGELMANN, M.D. Post-graduate School of Medicine, St. Louis.	4 fingers' breadth.	"Wash with 2 per cent carbolic solution. Strew with iodoform, and dress with square of cotton or lint rag anointed with 10 per cent carbolated vaseline, and changed daily with bath. After stump drops, iodoform and carbolated vaseline, with a little cotton on the umbilicus. Never have suppuration."	To retain dressings, prevent violent distension of abdominal muscles, and overcome tendency to umbilical hernia.
A. T. WOODWARD, M.D. University of Vermont, Brandon.	1 inch.	"Wash stump thoroughly with 1-200 bichloride solution, and envelop in muslin smeared with vaseline. No other dressing."	"Do not use it unless forced to by prejudice which I do not see fit to oppose. I do not see any necessity for any such support."
J. P. REYNOLDS, M.D. Med. Dept. of Harvard, Boston.	1½ inches. Strips cord.	"I cover it in any convenient way that will protect the skin of the child from contact with the old, decaying tissue. Free exposure to the air, or covering it with some antiseptic material, would probably be better."	"Band should not be too tightly fastened, so as to impede breathing or crying."
H. H. POWELL, M.D. Med. Dept. Western Reserve University, Cleveland, Ohio.	2½ inches. Uses linen tape.	Wrap in cotton without oiling. "I believe it to be an error to oil it, as it prevents dessication. Have seen nothing gained by stripping the cord." Bismuth after separation.	To retain dressing and prevent friction or pulling of cord.
PAUL F. MUNDE, M.D. Polyclinic (New York), Dartmouth Coll.	3 inches. Strips cord.	Envelop in dry linen or carbolized absorbent cotton.	"Because it tends to prevent umbilical hernia, does no harm, and protects the physician from blame in case of hernia."
F. S. DUNSTER, M.D. Michigan University, Dartmouth Coll.	3 inches. Strips cord.	Envelop in soft linen.	"Not if I can avoid it, as nurses invariably pin it too tight. Its only value is for warmth and to hold the cord in place until it drops off."

TABLE NO. 2 — CONTINUED.

AUTHORITY.	LIGATURE FROM ABDOMEN.	DRESSING OF STUMP.	USE OF BELLY-BAND.
HENRY C. GHENT, M.D. Belton, Texas.	1 to 1½ inches.	Wrap in old linen or muslin.	"I use the band partly for the purpose of keeping the dressing in place. The child being human, and no possible harm resulting, I would dress the cord for the sake of dressing it, if for nothing else."
JAMES CRAIG, M.D. Jersey City, N. J.	2½ to 3 inches. Uses elastic ligature.	Cotton; absorbent preferred.	"To retain dressing on stump and prevent umbilical hernia."
R. A. KINLOCK, M.D. Med. Coll. of South Carolina, Charleston.	¾ inch.	Absorbent cotton.	"Simply from habit, and to retain dressing to stump."
T. A. PORTER, M.D. Boston Lying-in Hospital.	1 inch.	Folded through square of linen oiled with sweet oil, and covered with a compress of linen. Carbolyzed oil, if it becomes offensive.	"To retain the dressing, to secure uniform warmth to the abdomen, to give additional support, and prevent umbilical hernia."
H. N. SMALL, M.D. School for Medical Instruction, Portland, Me.	2 inches.	"Bandage the cord with linen, and keep the parts dry and clean."	"Just for very cautious support."
THEOPH. PARVIS, M.D. Jefferson Medical College, Philadelphia.	1½ inches. Strips cord.	"Wrap with a few turns of an inch roller, or simply wrap with absorbent, antiseptic cotton."	"I let it be used rather than use it; but, of course, it must not strongly compress. If properly applied, it protects against dragging stump of cord."
ANITA E. TYNG, M.D. Resident Physician Woman's Hospital, Philadelphia.	2 inches. Not tied.	Cord is not cut on the bed, unless some emergency occurs. Child is let lie until placenta is expelled. The placenta is put in a basin and set in the crib beside the child until the doctor is ready to attend to it. Stump has blood squeezed out after being cut. Seldom have hemorrhage. A few cases have occurred when ligature was used. No dressing of any kind is used not even a band.	

CONCLUSIONS.

1. After respiration is fully established the cord should be stripped and tied, after careful inspection, quite close to the abdomen, and the stump cut short.

2. The elastic ligature is easily applied, and offers the best security against secondary hemorrhage.

3. The stump should be treated dry, by free exposure to the air, aided by some antiseptic absorbent powder, as bismuth, iodoform, or salicylated starch, which will also prevent chafing of the skin. All moist and greasy applications should be avoided; nor should it be confined by compress or band.

4. The belly-band is wholly unnecessary for warmth or dressing. The abdominal walls need no such support. It is of little or no value in preventing umbilical hernia, and has a tendency to produce inguinal hernia. When pinned tightly, as it invariably is by nurses, it impedes respiration, retards proper development of the abdominal muscles, and interferes with proper peristaltic action of the bowels, causing constipation, and renders the child uncomfortable.

5. Being unnecessary, and liable to be injurious, its use should be wholly abandoned.

